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Lyndon B. Johnson Space Center



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A New Dry Biomedical Electrode

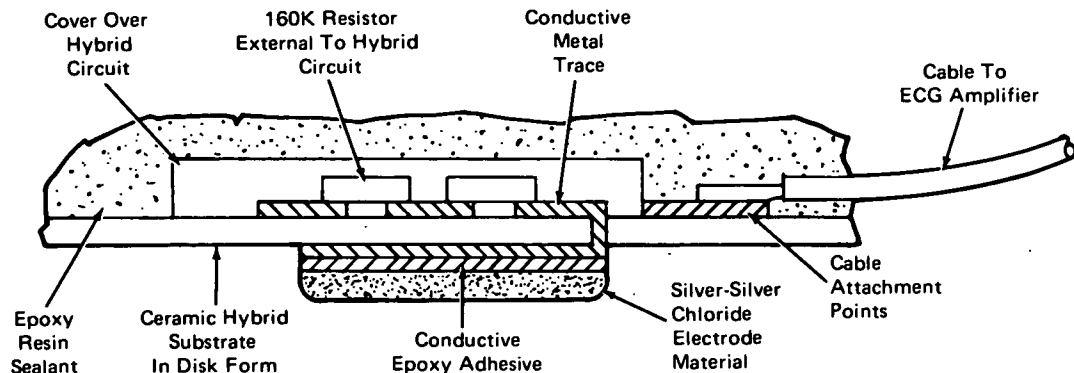


Figure 1. Dry Electrode

The problem:

When electronically monitoring heart beats and other life signs by means of electrodes attached to the skin, it is normally necessary to use some method to overcome the resistance of the skin to current. For this purpose, a moist conductive paste is used to attach the electrode. Over a period, this paste may irritate the skin, requiring periodic removal of the electrode.

The solution:

A dry, strap-on electrode that will not irritate the skin houses an improved electronic amplifier and circuitry that matches the impedance of the skin.

How it's done:

Figure 1 is a schematic of the electrode which uses the silver-silver chloride system common in electrodes.

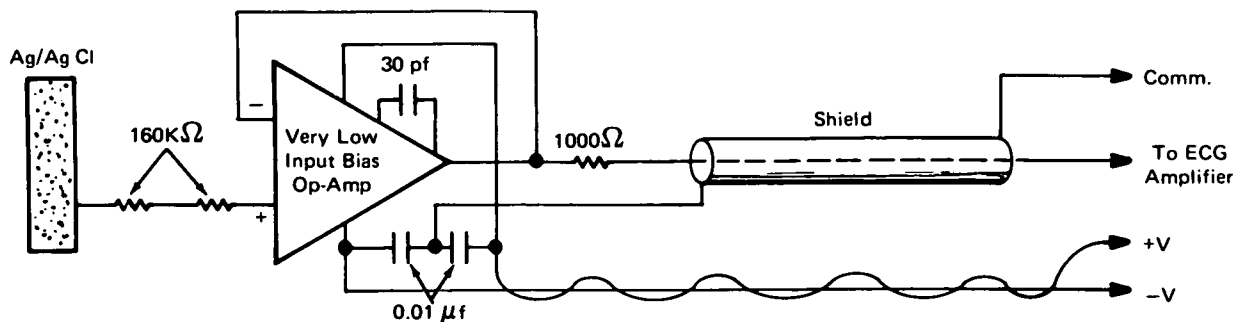


Figure 2. Buffer Electronics for dry Electrode

(continued overleaf)

However, the electronic circuitry (Figure 2) contains a new operational amplifier that incorporates monolithic super-gain transistors. It has an extremely low input bias current that makes possible an exceptionally high input impedance. This allows the electrode to be used without conductive paste.

The electrode does not provide voltage amplification as would be the case with conventional amplifiers. Instead, it acts as a current amplifier to make it possible to pick up electrical potentials from the surface of highly resistant dry skin. The amplifier is configured as a voltage follower, and is provided with decoupling capacitors on the power supply leads. The circuit includes two 160 kilohm resistors in the input lead to protect the patient in the event of failure within the assembly or the power supply.

The dry electrode can be attached to the skin with no surface preparation, has no offset, no temperature instability, and requires no auxiliary current sources in the signal amplifier. It is the same size as a wet electrode and may be used in its place without modification to signal amplifiers.

Note:

Requests for further information may be directed to:
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Reference: TSP73-10146

Patent status:

Inquiries concerning rights for the commercial use of this invention should be addressed to:

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